

REMARKS

This is in response to the Office Actions dated December 23, 2003 and July 29, 2003. New claims 21-22 have been added. Thus, claims 1-11 and 14-22 are now pending.

General

For purposes of example, and without limitation, certain example embodiments of this invention relate to a coating liquid to be used in an *inkjet head* for depositing an organic layer of an LED. The following methods of forming organic LED layers in organic LED devices are known: (a) spin coating, (b) blade coating, (c) inkjet and (d) laser transfer. The instant inventor has found that the inkjet method (c) is influenced by the molecular weight of the organic LED material. Thus, an object of certain example embodiments of this invention is to prevent the inkjet head from being clogged with the coating liquid when the organic LED layer of the organic LED device is formed by the inkjet method.

The instant specification explains that conventional *spin coating of such organic layers of LEDs is problematic* in that patterning is very difficult. In order to solve this problem, certain example embodiments of the instant invention utilize *inkjet* deposition of the coating liquid to form the organic LED layer. Moreover, as explained above, the instant inventor has found that the use of organic material(s) having a weight-average molecular weight less than 600,000 (more preferably from 20,000 to 100,000) and a viscosity of 62 mPa·s or less at 20 degrees C (more preferably no greater than 10 mPa·s,

and most preferably from 2-6 mPa·s) is particularly advantageous in that *inkjet head clogging can be reduced/prevented*. When the coating liquid fills a head(s) of an inkjet printer, and is discharged, the prevention of such clogging according to certain embodiments of this invention allows for continuous manufacturing to be carried out.

Claim 21

New claim 21 includes previous claim 4. Previous claim 4 was rejected under Section 102(b) as being allegedly anticipated by Ueda. This Section 102(b) rejection is respectfully traversed for at least the following reasons.

Claim 21 requires that "the coating liquid has a viscosity of 10 mPa·s or less at 20⁰C." This claimed low viscosity is important and advantageous in that it permits significant advantages such as reduction in clogging to be achieved in ink-jet applications (e.g., pg. 29, lines 10-17).

Ueda fails to disclose or suggest the aforesaid viscosity required by claim 21. The Office Action's apparent contention that this claimed viscosity is inherently present in Ueda is wrong, and entirely unsupported. Nothing in Ueda discloses or suggests the claimed viscosity.

Claim 21 cannot possibly be anticipated by Ueda. Moreover, the unexpected results discussed above associated with this claimed viscosity range overcome any case of obviousness.

Claims 4-5

Claim 4 requires that the coating liquid has a viscosity of 10 mPa·s or less at 20⁰C, and claim 5 requires a viscosity of 2 to 6 mPa·s at 20⁰C. Ueda fails to disclose or suggest the viscosity requirement(s) of claims 4 and 5. Again, these claims 4 and 5 cannot possibly be anticipated by Ueda. The Office Action's unsupported contention that these viscosities are "inherent" in Ueda is incorrect and lacks merit; and should be withdrawn. Even if the Examiner ignores the "inkjet" aspect of these claims, the reference still fails to meet the viscosity aspects of claims 4-5.

Claims 19-20

Claims 19-20 require that the solvent comprises at least one solvent having a vapor pressure of 10 mmHg or less at 20 degrees C. Ueda fails to disclose or suggest this aspect of claims 19-20. Instead, Ueda's examples teaches directly away from this aspect of claims 19-20 since Ueda's toluene as a solvent has a vapor pressure of 27 mmHg at 20 degrees C – well above the claimed "10 mmHg or less" required by claims 19-20. Ueda is entirely unrelated to the inventions of claims 19-20. Claim 7 also clearly defines over Ueda in this respect.

Claim 22

Claim 22 requires "an organic material having a weight-average molecular weight less than 600,000 whereby clogging of an inkjet head used in said inkjet method is prevented when the coating liquid is charged in the inkjet head and discharged therefrom."

Ueda fails to disclose or suggest using the liquid in an *inkjet* method or an inkjet head as required by claim 22. Ueda discloses a method of forming an EL device including a light emitting layer and/or a transport layer using a *spin coating* technique (e.g., col. 15, lines 47-50; col. 19, line 49) [the instant specification explains that spin coating is problematic as mentioned above]. The organic polymeric fluorescent substance in the liquid used for forming such an organic layer may have a molecular weight of from 10^3 to 10^7 , calculated as polystyrene (e.g., col. 14, lines 39-42). While a portion of this molecular weight range does appear to overlap with a portion of the claimed range, Ueda clearly fails to disclose or suggest the claimed inkjet technique and inkjet head recited in claim 22.

In fact, the coating liquids of Examples 1-4 of Ueda (all Examples of Ueda's alleged invention) could not be used in an inkjet deposition system with an inkjet head. In particular, Examples 1-4 of Ueda use *toluene* as a main solvent (e.g., col. 19, lines 24 and 48; col. 21, line 51; and col. 22, line 12). Toluene as a solvent has a vapor pressure of 27 mmHg at 20 degrees C. Thus, clogging would likely result if this was used in an inkjet head due to volatilization of toluene, in view of the high vapor pressure thereof. Thus, it can be seen that all examples of Ueda could not even be used in an inkjet system as required by claim 22. To summarize, not only does Ueda fail to disclose or suggest the claimed coating liquid for use in an inkjet deposition system, but Ueda teaches directly away from the invention of claim 1 by disclosing in its examples coatings which

cannot be used in the claimed inkjet system. Claim 22 defines over the cited art in this respect.

The "inkjet head" requirement of claim 22, and the recitation of clogging prevention therein, cannot be ignored especially since the examples of Ueda could not even be used in an inkjet device as explained above. One of ordinary skill in the art, upon reviewing Ueda's materials, would readily recognize that such materials could not be used in an inkjet device.

Claim 1

Claim 1 requires a "coating liquid for forming an organic LED layer which is used for forming an organic LED layer of an organic LED device by an inkjet method, comprising at least: a solvent, and an organic material having a weight-average molecular weight less than 600,000." As explained above, the instant inventor has surprisingly found that the claimed weight-average molecular weight less than 600,000 allows inkjet head clogging to be significantly reduced. The cited art fails to disclose or suggest the aforesaid underlined combination required by claim 1.

Ueda fails to disclose or suggest using the liquid in an *inkjet* method. Ueda discloses a method of forming an EL device including a light emitting layer and/or a transport layer using a *spin coating* technique (e.g., col. 15, lines 47-50; col. 19, line 49) [the instant specification explains that spin coating is problematic as mentioned above]. The organic polymeric fluorescent substance in the liquid used for forming such an organic layer may have a molecular weight of from 10^3 to 10^7 , calculated as polystyrene

(e.g., col. 14, lines 39-42). While a portion of this molecular weight range does appear to overlap with a portion of the claimed range, Ueda clearly fails to disclose or suggest the claimed inkjet technique. In fact, the coating liquids of Examples 1-4 of Ueda (all Examples of Ueda's alleged invention) could not be used in an inkjet deposition system with an inkjet head. In particular, Examples 1-4 of Ueda use *toluene* as a main solvent (e.g., col. 19, lines 24 and 48; col. 21, line 51; and col. 22, line 12). Toluene as a solvent has a vapor pressure of 27 mmHg at 20 degrees C. Thus, clogging would likely result if this was used in an inkjet head due to volatilization of toluene, in view of the high vapor pressure thereof. Thus, it can be seen that all examples of Ueda could not even be used in an inkjet system as required by claim 1. To summarize, not only does Ueda fail to disclose or suggest the claimed coating liquid for use in an inkjet deposition system, but Ueda teaches directly away from the invention of claim 1 by disclosing in its examples coatings which cannot be used in the claimed inkjet system. Claim 1 is not anticipated.

The Office Action contends that the "inkjet" aspect of claim 1 can be ignored since the claims are directed toward a liquid. However, applicant respectfully submits that the "inkjet" requirement of claim 1 cannot be ignored, especially since the examples of Ueda could not even be used in an inkjet device as explained above. One of ordinary skill in the art, upon reviewing Ueda's materials, would readily recognize that such materials could not be used in an inkjet device as explained above.

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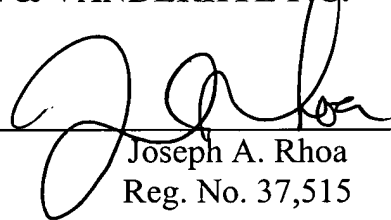
Conclusion

For at least the foregoing reasons, it is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

Respectfully submitted,

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